only be effected, when the solution of a far greater puzzle, viz. the construction of the spiral and its peculiar genesis, shall be achieved; and I would beg Mohl to direct his attention to this, as I myself have done long since. Heartily should I rejoice with him should it fall to his lot to solve this problem as he has already done in so many other cases.

VI.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin.

[Continued from vol. vii. p. 471.]

On the Evolution of Heat by Plants.

A very beautiful series of experiments on this subject has been published by MM. G. Vrolik and W. H. de Vriese*; they have continued their researches on the evolution of heat in the spadix of *Colocasia odora*; they were published at the end of 1838, but we received the journals too late to be able to insert them in our former Report.

The above-mentioned observers express their astonishment at the explanation given by M. Raspail of the evolution of heat in the spadix of the *Aroideæ*, but add that their new observations were not made in order to disprove Raspail's view, for that is not necessary. The first observations were made with the spadix of *Arum italicum*; they were made in the open air, and no rise of temperature was observed: in the interior of an orangery another flower exhibited a considerable increase of warmth, and also when the light was shut out and the spatha removed, still an increase of temperature took place, as was to be expected. Moreover experiments were made with the spadices of *Colocasia odora* under similar circumstances, both when the spadix was cut away and when only turned back; the maximum difference between the temperature of the air and the interior of the spadix was 19¾° Fahr.

Moreover interesting experiments were made on the phænomena exhibited by the spadices of *Colocasia* in different gases, for which purpose a very excellent apparatus was contrived. The rise of temperature in two perfectly similar spadices which happened to be in perfection at the same time was observed, one in the common air and the other in the above instrument in an atmosphere of oxygen. The latter in

* Tijdschrift voor Natuurl. Geschieden. en Phys., vol. iii. pp. 190—230; also in Wiegmann's Archiv for 1839, p. 135.

only be effected, when the solution of a far greater puzzle, viz. the construction of the spiral and its peculiar genesis, shall be achieved; and I would beg Mohl to direct his attention to this, as I myself have done long since. Heartily should I rejoice with him should it fall to his lot to solve this problem as he has already done in so many other cases.

VI.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin.

[Continued from vol. vii. p. 471.]

On the Evolution of Heat by Plants.

A very beautiful series of experiments on this subject has been published by MM. G. Vrolik and W. H. de Vriese*; they have continued their researches on the evolution of heat in the spadix of *Colocasia odora*; they were published at the end of 1838, but we received the journals too late to be able to insert them in our former Report.

The above-mentioned observers express their astonishment at the explanation given by M. Raspail of the evolution of heat in the spadix of the *Aroideæ*, but add that their new observations were not made in order to disprove Raspail's view, for that is not necessary. The first observations were made with the spadix of *Arum italicum*; they were made in the open air, and no rise of temperature was observed: in the interior of an orangery another flower exhibited a considerable increase of warmth, and also when the light was shut out and the spatha removed, still an increase of temperature took place, as was to be expected. Moreover experiments were made with the spadices of *Colocasia odora* under similar circumstances, both when the spadix was cut away and when only turned back; the maximum difference between the temperature of the air and the interior of the spadix was 19¾° Fahr.

Moreover interesting experiments were made on the phænomena exhibited by the spadices of *Colocasia* in different gases, for which purpose a very excellent apparatus was contrived. The rise of temperature in two perfectly similar spadices which happened to be in perfection at the same time was observed, one in the common air and the other in the above instrument in an atmosphere of oxygen. The latter in

only be effected, when the solution of a far greater puzzle, viz. the construction of the spiral and its peculiar genesis, shall be achieved; and I would beg Mohl to direct his attention to this, as I myself have done long since. Heartily should I rejoice with him should it fall to his lot to solve this problem as he has already done in so many other cases.

---

* Tijdschrift voor Natuurl. Geschieden. en Phys., vol. iii. pp. 190—230; also in Wiegmann's Archiv for 1839, p. 135.

VI.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin.

[Continued from vol. vii. p. 471.]

On the Evolution of Heat by Plants.

A very beautiful series of experiments on this subject has been published by MM. G. Vrolik and W. H. de Vriese*; they have continued their researches on the evolution of heat in the spadix of *Colocasia odora*; they were published at the end of 1838, but we received the journals too late to be able to insert them in our former Report.

The above-mentioned observers express their astonishment at the explanation given by M. Raspail of the evolution of heat in the spadix of the *Aroideæ*, but add that their new observations were not made in order to disprove Raspail's view, for that is not necessary. The first observations were made with the spadix of *Arum italicum*; they were made in the open air, and no rise of temperature was observed: in the interior of an orangery another flower exhibited a considerable increase of warmth, and also when the light was shut out and the spatha removed, still an increase of temperature took place, as was to be expected. Moreover experiments were made with the spadices of *Colocasia odora* under similar circumstances, both when the spadix was cut away and when only turned back; the maximum difference between the temperature of the air and the interior of the spadix was 19¾° Fahr.

Moreover interesting experiments were made on the phænomena exhibited by the spadices of *Colocasia* in different gases, for which purpose a very excellent apparatus was contrived. The rise of temperature in two perfectly similar spadices which happened to be in perfection at the same time was observed, one in the common air and the other in the above instrument in an atmosphere of oxygen. The latter in

half an hour exhibited a temperature 4° higher than the one in the air. Oxygen was passed into the apparatus from time to time; it was confined by means of water, which also absorbed the greater part of the carbonic acid produced by the inflammation (verbrennung) of the spadix. In nitrogen no rise of temperature was observed, and it could not be seen that any gas was absorbed; all vital activity, and even the colour, were lost.

---

* Tijdschrift voor Natuurl. Geschieden. en Phys., vol. iii. pp. 190—230; also in Wiegmann's Archiv for 1839, p. 135.

M. de Vriese* has also communicated some observations made by a M. C. Hasskarl, in Java, on the spadices of *Colocasia odora*; he found 22° Fahr. as the greatest difference between the temperature of the spadix and that of the external air, and this in the morning at eight o'clock; the next morning there was only a difference of 10° Fahr.

M. Dutrochet† observed the evolution of heat in the spadix of *Arum maculatum* by means of a thermo-electric instrument, which MM. van Beck and Bergsma (vide former Report, p. 83) also employed; he found the highest temperature exactly at the time when the spatha opens, and this exceeded the temperature of the air by from 11° to 12° C. In another note ‡ of the 11th of May, M. Dutrochet mentions, that during the night the temperature of every part of the spadix of *Arum maculatum* decreases, and increases again by day; it reaches its maximum early in the day, then diminishes, and disappears altogether in the night.

In the sitting of the Parisian Academy § of the 10th of June, M. Dutrochet's researches on the temperature of plants (which had been delivered in on the 1st of July, 1838) were read. He says—plants possess a peculiar warmth; but this is completely absorbed by the evaporation of the sap, by the evolution of oxygen by day and of carbonic acid by night. It rather seems that, in the natural state, plants possess the property of producing cold, for they almost always have a lower temperature than that of the surrounding air. If however the evaporation is prevented, it becomes easy to observe the proper temperature of plants; for this purpose M. Dutrochet used a thermo-electrical apparatus. For the sake of comparison the experiments were made both with living and dead plants; the latter acquired the temperature of the surrounding medium, the former the same, with the addition of that which was hindered or destroyed by the evaporation; the latter M. Dutrochet reckons in maximo at $\frac{1}{4}$° Cels.; it is often only $\frac{1}{6}$°,

half an hour exhibited a temperature 4° higher than the one in the air. Oxygen was passed into the apparatus from time to time; it was confined by means of water, which also absorbed the greater part of the carbonic acid produced by the inflammation (verbrennung) of the spadix. In nitrogen no rise of temperature was observed, and it could not be seen that any gas was absorbed; all vital activity, and even the colour, were lost.

---

* Tijdschrift, &c., 5. iii. pp. 230—233.

† Comptes Rendus de 6 Mai 1839, p. 695.

‡ *Ibid.*, p. 741.

§ *Ibid.*, 10 Juin 1839, pp. 907—911.

M. de Vriese* has also communicated some observations made by a M. C. Hasskarl, in Java, on the spadices of *Colocasia odora*; he found 22° Fahr. as the greatest difference between the temperature of the spadix and that of the external air, and this in the morning at eight o'clock; the next morning there was only a difference of 10° Fahr.

M. Dutrochet† observed the evolution of heat in the spadix of *Arum maculatum* by means of a thermo-electric instrument, which MM. van Beck and Bergsma (vide former Report, p. 83) also employed; he found the highest temperature exactly at the time when the spatha opens, and this exceeded the temperature of the air by from 11° to 12° C. In another note‡ of the 11th of May, M. Dutrochet mentions, that during the night the temperature of every part of the spadix of *Arum maculatum* decreases, and increases again by day; it reaches its maximum early in the day, then diminishes, and disappears altogether in the night.

In the sitting of the Parisian Academy § of the 10th of June, M. Dutrochet's researches on the temperature of plants (which had been delivered in on the 1st of July, 1838) were read. He says—plants possess a peculiar warmth; but this is completely absorbed by the evaporation of the sap, by the evolution of oxygen by day and of carbonic acid by night. It rather seems that, in the natural state, plants possess the property of producing cold, for they almost always have a lower temperature than that of the surrounding air. If however the evaporation is prevented, it becomes easy to observe the proper temperature of plants; for this purpose M. Dutrochet used a thermo-electrical apparatus. For the sake of comparison the experiments were made both with living and dead plants; the latter acquired the temperature of the surrounding medium, the former the same, with the addition of that which was hindered or destroyed by the evaporation; the latter M. Dutrochet reckons in maximo at $\frac{1}{4}$° Cels.; it is often only $\frac{1}{6}$°,

half an hour exhibited a temperature 4° higher than the one in the air. Oxygen was passed into the apparatus from time to time; it was confined by means of water, which also absorbed the greater part of the carbonic acid produced by the inflammation (verbrennung) of the spadix. In nitrogen no rise of temperature was observed, and it could not be seen that any gas was absorbed; all vital activity, and even the colour, were lost.

---

* Tijdschrift, &c., 5. iii. pp. 230—233.

† Comptes Rendus de 6 Mai 1839, p. 695.

‡ *Ibid.*, p. 741.

§ *Ibid.*, 10 Juin 1839, pp. 907—911.

M. de Vriese* has also communicated some observations made by a M. C. Hasskarl, in Java, on the spadices of *Colocasia odora*; he found 22° Fahr. as the greatest difference between the temperature of the spadix and that of the external air, and this in the morning at eight o'clock; the next morning there was only a difference of 10° Fahr.

M. Dutrochet† observed the evolution of heat in the spadix of *Arum maculatum* by means of a thermo-electric instrument, which MM. van Beck and Bergsma (vide former Report, p. 83) also employed; he found the highest temperature exactly at the time when the spatha opens, and this exceeded the temperature of the air by from 11° to 12° C. In another note ‡ of the 11th of May, M. Dutrochet mentions, that during the night the temperature of every part of the spadix of *Arum maculatum* decreases, and increases again by day; it reaches its maximum early in the day, then diminishes, and disappears altogether in the night.

In the sitting of the Parisian Academy § of the 10th of June, M. Dutrochet's researches on the temperature of plants (which had been delivered in on the 1st of July, 1838) were read. He says—plants possess a peculiar warmth; but this is completely absorbed by the evaporation of the sap, by the evolution of oxygen by day and of carbonic acid by night. It rather seems that, in the natural state, plants possess the property of producing cold, for they almost always have a lower temperature than that of the surrounding air. If however the evaporation is prevented, it becomes easy to observe the proper temperature of plants; for this purpose M. Dutrochet used a thermo-electrical apparatus. For the sake of comparison the experiments were made both with living and dead plants; the latter acquired the temperature of the surrounding medium, the former the same, with the addition of that which was hindered or destroyed by the evaporation; the latter M. Dutrochet reckons in maximo at $\frac{1}{4}$° Cels.; it is often only $\frac{1}{6}$°,

---

[*] Tijdschrift, &c., 5. iii. pp. 230—233.

[†] Comptes Rendus de 6 Mai 1839, p. 695.

[‡] *Ibid.*, p. 741.

[§] *Ibid.*, 10 Juin 1839, pp. 907—911.

or even $\frac{1}{10}$° or $\frac{1}{12}$°. The proper heat of young twigs and leaves vanishes during the night, or in general in the dark, and appears again under the influence of light. The higher the external temperature, the greater is the vegetable warmth. That part of the heat of plants which is carried off by the evolution of oxygen cannot be determined quantitatively.

M. Dutrochet had probably given the above researches into the safe keeping of the Academy, in order to secure to himself the priority of the discovery; however, the proofs that plants possess a peculiar heat resulting from their vital activity have been long since published in Germany; and in the second part of my 'Physiology,' published in the beginning of the year 1838, I have proved that an evolution of heat is exhibited not only by germinating seeds and by the fresh fruits of *Areca Catechu* when lying together, but also by leaves and herbs in general; "singly they do not exhibit any warmth on account of the evaporation, but so much the more when they lie together in masses." It must not be believed that I state this as a simple idea or theory, for I have convinced myself of its correctness with the thermometer in my hand; I have several times experimented with fresh-cut grass and fresh spinach leaves*. At the same time I showed, that those botanists who wished to prove or disprove the existence of vegetable heat could not choose a worse part for their experiments than the *wood*. The very low degree of warmth mentioned by M. Dutrochet is not sufficient to prove the existence of vegetable heat; for in my first Report (Wiegmann's Archiv, 1835) I have mentioned some experiments, according to which bad conductors, as for instance, the wood of chairs and tables in my room, exhibited an excess of heat of 2° R. above that of the air, etc. A note which M. Dutrochet has added to the above letter on the 6th of June 1839, states that his new researches confirm the former ones. In the stem of *Euphorbia lathyris* he saw the vegetable heat amount to $\frac{1}{3}$° C., but only so long as it was in a verdant state. He also remarked the heat in the roots, fruits, and even in the embryos. Complete exclusion of light totally prevents the rise and fall of temperature, but this does not always take place the first day; M. Dutrochet remarked the change of temperature by night and by day even on the second day of the experiment.

From some remarks on the above treatise of M. Dutrochet† made by M. Becquerel, it appears that he had used the thermo-electrical apparatus for determining the heat of plants two

or even $\frac{1}{10}$° or $\frac{1}{12}$°. The proper heat of young twigs and leaves vanishes during the night, or in general in the dark, and appears again under the influence of light. The higher the external temperature, the greater is the vegetable warmth. That part of the heat of plants which is carried off by the evolution of oxygen cannot be determined quantitatively.

---

* Is not the accession of heat in this case the result of fermentation?—Ed.

† Comptes Rendus de 17 Juin, p. 939.

M. Dutrochet had probably given the above researches into the safe keeping of the Academy, in order to secure to himself the priority of the discovery; however, the proofs that plants possess a peculiar heat resulting from their vital activity have been long since published in Germany; and in the second part of my 'Physiology,' published in the beginning of the year 1838, I have proved that an evolution of heat is exhibited not only by germinating seeds and by the fresh fruits of *Areca Catechu* when lying together, but also by leaves and herbs in general; "singly they do not exhibit any warmth on account of the evaporation, but so much the more when they lie together in masses." It must not be believed that I state this as a simple idea or theory, for I have convinced myself of its correctness with the thermometer in my hand; I have several times experimented with fresh-cut grass and fresh spinach leaves*. At the same time I showed, that those botanists who wished to prove or disprove the existence of vegetable heat could not choose a worse part for their experiments than the *wood*. The very low degree of warmth mentioned by M. Dutrochet is not sufficient to prove the existence of vegetable heat; for in my first Report (Wiegmann's Archiv, 1835) I have mentioned some experiments, according to which bad conductors, as for instance, the wood of chairs and tables in my room, exhibited an excess of heat of 2° R. above that of the air, etc. A note which M. Dutrochet has added to the above letter on the 6th of June 1839, states that his new researches confirm the former ones. In the stem of *Euphorbia lathyris* he saw the vegetable heat amount to $\frac{1}{3}$° C., but only so long as it was in a verdant state. He also remarked the heat in the roots, fruits, and even in the embryos. Complete exclusion of light totally prevents the rise and fall of temperature, but this does not always take place the first day; M. Dutrochet remarked the change of temperature by night and by day even on the second day of the experiment.

From some remarks on the above treatise of M. Dutrochet† made by M. Becquerel, it appears that he had used the thermoelectrical apparatus for determining the heat of plants two

or even $\frac{1}{10}$° or $\frac{1}{12}$°. The proper heat of young twigs and leaves vanishes during the night, or in general in the dark, and appears again under the influence of light. The higher the external temperature, the greater is the vegetable warmth. That part of the heat of plants which is carried off by the evolution of oxygen cannot be determined quantitatively.

---

* Is not the accession of heat in this case the result of fermentation?—Ed.

† Comptes Rendus de 17 Juin, p. 939.

M. Dutrochet had probably given the above researches into the safe keeping of the Academy, in order to secure to himself the priority of the discovery; however, the proofs that plants possess a peculiar heat resulting from their vital activity have been long since published in Germany; and in the second part of my 'Physiology,' published in the beginning of the year 1838, I have proved that an evolution of heat is exhibited not only by germinating seeds and by the fresh fruits of *Areca Catechu* when lying together, but also by leaves and herbs in general; "singly they do not exhibit any warmth on account of the evaporation, but so much the more when they lie together in masses." It must not be believed that I state this as a simple idea or theory, for I have convinced myself of its correctness with the thermometer in my hand; I have several times experimented with fresh-cut grass and fresh spinach leaves*. At the same time I showed, that those botanists who wished to prove or disprove the existence of vegetable heat could not choose a worse part for their experiments than the *wood*. The very low degree of warmth mentioned by M. Dutrochet is not sufficient to prove the existence of vegetable heat; for in my first Report (Wiegmann's Archiv, 1835) I have mentioned some experiments, according to which bad conductors, as for instance, the wood of chairs and tables in my room, exhibited an excess of heat of 2° R. above that of the air, etc. A note which M. Dutrochet has added to the above letter on the 6th of June 1839, states that his new researches confirm the former ones. In the stem of *Euphorbia lathyris* he saw the vegetable heat amount to $\frac{1}{3}$° C., but only so long as it was in a verdant state. He also remarked the heat in the roots, fruits, and even in the embryos. Complete exclusion of light totally prevents the rise and fall of temperature, but this does not always take place the first day; M. Dutrochet remarked the change of temperature by night and by day even on the second day of the experiment.

From some remarks on the above treatise of M. Dutrochet† made by M. Becquerel, it appears that he had used the thermoelectrical apparatus for determining the heat of plants two

years ago. The observations were made in company with M. Mirbel in the botanical garden on the twigs of an *Acacia*: observations on dead and living boughs gave directly the most striking differences of temperature. In the following year M. Dutrochet wished to institute similar experiments, and made use of the advice and experience of M. Becquerel*. In the sitting of the Academy of 1st of July, M. Dutrochet replied to the statements of M. Becquerel, and endeavoured to show that his observations by no means proved with certainty the existence of a peculiar heat in plants.

---

* Is not the accession of heat in this case the result of fermentation?—Ed.

† Comptes Rendus de 17 Juin, p. 939.

MM. Bergsma and van Beck†, in consequence of Dutrochet's researches, have sent a letter to the Academy at Paris, in which they describe their new experiments on the heat of vegetables, by which it is clearly proved that the transpiration is the cause of the difficulty in measuring the peculiar temperature. They chose (in January 1839) a hyacinth growing in a glass for their experiments. The glass was put into another vessel containing water of a higher temperature, in order in this manner to increase the activity of the roots.

The needles of the thermo-electrical apparatus were then inserted into the external parts of the flower-stalk, and instead of an increase of temperature, they observed a fall; the apparatus exhibited, viz. 17·5° C., while that of the water was 28·5°. The experiment was repeated several times with like success, as also with the pedunculus of *Entelea arborescens*, R. Br. This phænomenon is explained by the powerful evaporation which is caused by the increased activity promoted by the warm water. When the needles were inserted into the middle of the flower-stalk of the hyacinth, the temperature of the interior was found to be 1° higher than that of the surrounding air.

All the above treatises of Dutrochet, Becquerel, Bergsma, and van Beck, are to be found in the August number of the 'Annales des Sciences Naturelles.'

On the 21st of November M. Dutrochet‡ communicated to the Academy some new observations which he had made during the previous summer on the heat of vegetables; he states generally that plants possess a peculiar heat, which is principally located in the green parts. This heat exhibits a daily periodicity; it reaches its maximum towards midday, and its minimum during the night. M. Dutrochet communicated his special experiments on different plants, from which the daily variations of temperature may be recognised, *e. g.* in

years ago. The observations were made in company with M. Mirbel in the botanical garden on the twigs of an *Acacia*: observations on dead and living boughs gave directly the most striking differences of temperature. In the following year M. Dutrochet wished to institute similar experiments, and made use of the advice and experience of M. Becquerel*. In the sitting of the Academy of 1st of July, M. Dutrochet replied to the statements of M. Becquerel, and endeavoured to show that his observations by no means proved with certainty the existence of a peculiar heat in plants.

---

* Comptes Rendus de 1 Juillet, p. 47.

† *Ibid.*, 2 Septembre, p. 328.

‡ *Ibid.*, 18 Nov., p. 613.

MM. Bergsma and van Beck†, in consequence of Dutrochet's researches, have sent a letter to the Academy at Paris, in which they describe their new experiments on the heat of vegetables, by which it is clearly proved that the transpiration is the cause of the difficulty in measuring the peculiar temperature. They chose (in January 1839) a hyacinth growing in a glass for their experiments. The glass was put into another vessel containing water of a higher temperature, in order in this manner to increase the activity of the roots. The needles of the thermo-electrical apparatus were then inserted into the external parts of the flower-stalk, and instead of an increase of temperature, they observed a fall; the apparatus exhibited, viz. 17·5° C., while that of the water was 28·5°. The experiment was repeated several times with like success, as also with the pedunculus of *Entelea arborescens*, R. Br. This phænomenon is explained by the powerful evaporation which is caused by the increased activity promoted by the warm water. When the needles were inserted into the middle of the flower-stalk of the hyacinth, the temperature of the interior was found to be 1° higher than that of the surrounding air.

All the above treatises of Dutrochet, Becquerel, Bergsma, and van Beck, are to be found in the August number of the 'Annales des Sciences Naturelles.'

On the 21st of November M. Dutrochet‡ communicated to the Academy some new observations which he had made during the previous summer on the heat of vegetables; he states generally that plants possess a peculiar heat, which is principally located in the green parts. This heat exhibits a daily periodicity; it reaches its maximum towards midday, and its minimum during the night. M. Dutrochet communicated his special experiments on different plants, from which the daily variations of temperature may be recognised, *e. g.* in

years ago. The observations were made in company with M. Mirbel in the botanical garden on the twigs of an *Acacia*: observations on dead and living boughs gave directly the most striking differences of temperature. In the following year M. Dutrochet wished to institute similar experiments, and made use of the advice and experience of M. Becquerel*. In the sitting of the Academy of 1st of July, M. Dutrochet replied to the statements of M. Becquerel, and endeavoured to show that his observations by no means proved with certainty the existence of a peculiar heat in plants.

---

* Comptes Rendus de 1 Juillet, p. 47.

† *Ibid.*, 2 Septembre, p. 328.

‡ *Ibid.*, 18 Nov., p. 613.

MM. Bergsma and van Beck†, in consequence of Dutrochet's researches, have sent a letter to the Academy at Paris, in which they describe their new experiments on the heat of vegetables, by which it is clearly proved that the transpiration is the cause of the difficulty in measuring the peculiar temperature. They chose (in January 1839) a hyacinth growing in a glass for their experiments. The glass was put into another vessel containing water of a higher temperature, in order in this manner to increase the activity of the roots. The needles of the thermo-electrical apparatus were then inserted into the external parts of the flower-stalk, and instead of an increase of temperature, they observed a fall; the apparatus exhibited, viz. 17·5° C., while that of the water was 28·5°. The experiment was repeated several times with like success, as also with the pedunculus of *Entelea arborescens*, R. Br. This phænomenon is explained by the powerful evaporation which is caused by the increased activity promoted by the warm water. When the needles were inserted into the middle of the flower-stalk of the hyacinth, the temperature of the interior was found to be 1° higher than that of the surrounding air.

All the above treatises of Dutrochet, Becquerel, Bergsma, and van Beck, are to be found in the August number of the 'Annales des Sciences Naturelles.'

On the 21st of November M. Dutrochet‡ communicated to the Academy some new observations which he had made during the previous summer on the heat of vegetables; he states generally that plants possess a peculiar heat, which is principally located in the green parts. This heat exhibits a daily periodicity; it reaches its maximum towards midday, and its minimum during the night. M. Dutrochet communicated his special experiments on different plants, from which the daily variations of temperature may be recognised, *e. g.* in

---

* Comptes Rendus de 1 Juillet, p. 47. † *Ibid.*, 2 Septembre, p. 328.
‡ *Ibid.*, 18 Nov., p. 613.

Euphorbia lathyris, L., which exhibits a considerable heat, which vanishes completely during the night, whilst in other plants traces of it remain. The hour at which plants reach their maximum temperature is the same for each single plant, but different for different plants; thus for instance, *Rosa canina* at 10h, *Allium Porrum* at 11h, *Borago officinalis* at midday, *Euphorbia lathyris* at 1h, *Sambucus nigra* at 2h, and *Asparagus offic.* and *Lactuca sativa* at 3h. The greatest heat is in the neighbourhood of the principal bud, and in woody plants often only in the green extremities. Other experiments confirm the fact, that plants growing in the dark lose their vegetable heat, but experiments on different fungi showed that these also possess a daily periodicity; *Boletus æneus* exhibited a heat of ½° C.

Finally M. Dutrochet* has published a short note on the heat of the spadix of *Arum maculatum.* The spadix exhibited the greatest heat in the first day of blossoming, and by its influence the rapid opening of the spatha was produced; on the second day the maximum was not so high, and was situated principally in the male flowers, by which the dispersion of the pollen was effected. What *Arum maculatum* here exhibits on the large scale is also seen in the young twigs of all other plants.

On the Odours of Plants.

The Academy of Sciences of Brussels has given as a prize-question for 1838, "The production of odours in flowers," which, as it remained unanswered, was repeated for 1839. As an answer to this question, M. Auguste Trinchinetti de Monga, formerly Professor at the University of Pavia, has sent in a memoir, which has been rewarded with the silver medal; and M. Morren has, in the name of the Academy, delivered a circumstantial report of this work, from which we shall here select the most important parts.

The work is divided into two sections; the first treats of the odours of flowers in general: the author speaks of the difference between the odours of the flowers and of the other parts of plants, of the organs of flowers which exhale the odours or from which they proceed, of those in which they are prepared, of the chemical characters of these substances, of the manner of exhalation, and lastly, of the function of odours. In the second part he treats of the odours in respect to their intensity, their quantity at different periods of the development of the flower, and in respect to the hours at which they are perceptible; he at the same time gives methods to investigate them, and speaks

---

* Comptes Rendus de 16 Dec., p. 781.

Euphorbia lathyris, L., which exhibits a considerable heat, which vanishes completely during the night, whilst in other plants traces of it remain. The hour at which plants reach their maximum temperature is the same for each single plant, but different for different plants; thus for instance, *Rosa canina* at 10^h, *Allium Porrum* at 11^h, *Borago officinalis* at mid-day, *Euphorbia lathyris* at 1^h, *Sambucus nigra* at 2^h, and *Asparagus offic.* and *Lactuca sativa* at 3^h. The greatest heat is in the neighbourhood of the principal bud, and in woody plants often only in the green extremities. Other experiments confirm the fact, that plants growing in the dark lose their vegetable heat, but experiments on different fungi showed that these also possess a daily periodicity; *Boletus æneus* exhibited a heat of ½° C.

Finally M. Dutrochet* has published a short note on the heat of the spadix of *Arum maculatum.* The spadix exhibited the greatest heat in the first day of blossoming, and by its influence the rapid opening of the spatha was produced; on the second day the maximum was not so high, and was situated principally in the male flowers, by which the dispersion of the pollen was effected. What *Arum maculatum* here exhibits on the large scale is also seen in the young twigs of all other plants.

On the Odours of Plants.

The Academy of Sciences of Brussels has given as a prize-question for 1838, "The production of odours in flowers," which, as it remained unanswered, was repeated for 1839. As an answer to this question, M. Auguste Trinchinetti de Monga, formerly Professor at the University of Pavia, has sent in a memoir, which has been rewarded with the silver medal; and M. Morren has, in the name of the Academy, delivered a circumstantial report of this work, from which we shall here select the most important parts.

The work is divided into two sections; the first treats of the odours of flowers in general: the author speaks of the difference between the odours of the flowers and of the other parts of plants, of the organs of flowers which exhale the odours or from which they proceed, of those in which they are prepared, of the chemical characters of these substances, of the manner of exhalation, and lastly, of the function of odours. In the second part he treats of the odours in respect to their intensity, their quantity at different periods of the development of the flower, and in respect to the hours at which they are perceptible; he at the same time gives methods to investigate them, and speaks

---

* Comptes Rendus de 16 Dec., p. 781.

Euphorbia lathyris, L., which exhibits a considerable heat, which vanishes completely during the night, whilst in other plants traces of it remain. The hour at which plants reach their maximum temperature is the same for each single plant, but different for different plants; thus for instance, *Rosa canina* at 10^h, *Allium Porrum* at 11^h, *Borugo officinalis* at midday, *Euphorbia lathyris* at 1^h, *Sambucus nigra* at 2^h, and *Asparagus offic.* and *Lactuca sativa* at 3^h. The greatest heat is in the neighbourhood of the principal bud, and in woody plants often only in the green extremities. Other experiments confirm the fact, that plants growing in the dark lose their vegetable heat, but experiments on different fungi showed that these also possess a daily periodicity; *Boletus æneus* exhibited a heat of ½° C.

Finally M. Dutrochet* has published a short note on the heat of the spadix of *Arum maculatum.* The spadix exhibited the greatest heat in the first day of blossoming, and by its influence the rapid opening of the spatha was produced; on the second day the maximum was not so high, and was situated principally in the male flowers, by which the dispersion of the pollen was effected. What *Arum maculatum* here exhibits on the large scale is also seen in the young twigs of all other plants.

On the Odours of Plants.

The Academy of Sciences of Brussels has given as a prize-question for 1838, "The production of odours in flowers," which, as it remained unanswered, was repeated for 1839. As an answer to this question, M. Auguste Trinchinetti de Monga, formerly Professor at the University of Pavia, has sent in a memoir, which has been rewarded with the silver medal; and M. Morren has, in the name of the Academy, delivered a circumstantial report of this work, from which we shall here select the most important parts.

The work is divided into two sections; the first treats of the odours of flowers in general: the author speaks of the difference between the odours of the flowers and of the other parts of plants, of the organs of flowers which exhale the odours or from which they proceed, of those in which they are prepared, of the chemical characters of these substances, of the manner of exhalation, and lastly, of the function of odours. In the second part he treats of the odours in respect to their intensity, their quantity at different periods of the development of the flower, and in respect to the hours at which they are perceptible; he at the same time gives methods to investigate them, and speaks principally of intermitting odours. There is found, says M. Trinchinetti, in all the parts of plants a certain odour arising from resinous or camphorous substances, as in the *Laurineæ*, *Labiatæ*, *Umbelliferæ*, and *Hesperideæ*; on the contrary, the odours of flowers are the effects of a particular function, by which a simple evaporation of the secreted substances is produced. [This, as well as most of the other statements, which are disproved by already existing observations, have been proved incorrect by the reporter M. Morren.] In general, the principal residence of the smell is in the upper surface of the corolla; if there is only a simple perigonium, the smell comes from its inner surface. The filaments have a smell similar to that of the corolla; the anthers, on the contrary, have a spermatic odour; the female organs are rarely odorous, as in saffron. The organs which evolve the odorous substances are, according to the author, always glands, which are said to have often escaped the observation of physiologists; however, M. Morren states that the author has applied the name of glands to some formations which certainly cannot be so called, *e. g.* he has held the resinous globules for glands, which I first discovered in the petals of *Magnolia grandiflora*; indeed M. Trinchinetti considers the papillæ on the petals to be organs in which these odoriferous matters are secreted. In relation to the chemical theory of the formation of odours, the author has only given that of Fourcroy and Couerbe; and he explains the exhalation of the odoriferous substances by a simple evaporation through organic and inorganic (?) pores, which takes place on the epidermis of the inner or upper surface of the flowering organs. If this upper surface be covered with wax, the result is said to become weaker; if the under surface be covered it remains the same, and turgescence increases the exhalation.

---

* Comptes Rendus de 16 Dec., p. 781.

The question, "For what purpose do flowers smell?" is answered by M. Trinchinetti as follows:—It may be that the smells of plants were destined as a source of pleasure for mankind, and by these they exhibit their medicinal properties. However, nature strives doubtlessly to effect more than one object by these odours,—they are evidently intended to assist the sexual functions of the flowers; for M. Trinchinetti believes that the sexual organs are nourished by a sap which is prepared in the petals. The odorous exhalations of flowers exert a physical influence on the sexual organs, inasmuch as they diminish the tension of the steam which is so very injurious to the pollen which is burst by it, and thus fertilization cannot take place. He states that the flowers are surrounded by an odoriferous atmosphere which defends the sexual organs from the injurious influence of the aqueous vapours;

principally of intermitting odours. There is found, says M. Trinchinetti, in all the parts of plants a certain odour arising from resinous or camphorous substances, as in the *Laurineæ, Labiatæ, Umbelliferæ,* and *Hesperideæ*; on the contrary, the odours of flowers are the effects of a particular function, by which a simple evaporation of the secreted substances is produced. [This, as well as most of the other statements, which are disproved by already existing observations, have been proved incorrect by the reporter M. Morren.] In general, the principal residence of the smell is in the upper surface of the corolla; if there is only a simple perigonium, the smell comes from its inner surface. The filaments have a smell similar to that of the corolla; the anthers, on the contrary, have a spermatic odour; the female organs are rarely odorous, as in saffron. The organs which evolve the odorous substances are, according to the author, always glands, which are said to have often escaped the observation of physiologists; however, M. Morren states that the author has applied the name of glands to some formations which certainly cannot be so called, *e. g.* he has held the resinous globules for glands, which I first discovered in the petals of *Magnolia grandiflora*; indeed M. Trinchinetti considers the papillæ on the petals to be organs in which these odoriferous matters are secreted. In relation to the chemical theory of the formation of odours, the author has only given that of Fourcroy and Couerbe; and he explains the exhalation of the odoriferous substances by a simple evaporation through organic and inorganic (?) pores, which takes place on the epidermis of the inner or upper surface of the flowering organs. If this upper surface be covered with wax, the result is said to become weaker; if the under surface be covered it remains the same, and turgescence increases the exhalation.

The question, "For what purpose do flowers smell?" is answered by M. Trinchinetti as follows:—It may be that the smells of plants were destined as a source of pleasure for mankind, and by these they exhibit their medicinal properties. However, nature strives doubtlessly to effect more than one object by these odours,—they are evidently intended to assist the sexual functions of the flowers; for M. Trinchinetti believes that the sexual organs are nourished by a sap which is prepared in the petals. The odorous exhalations of flowers exert a physical influence on the sexual organs, inasmuch as they diminish the tension of the steam which is so very injurious to the pollen which is burst by it, and thus fertilization cannot take place. He states that the flowers are surrounded by an odoriferous atmosphere which defends the sexual organs from the injurious influence of the aqueous vapours;

principally of intermitting odours. There is found, says M. Trinchinetti, in all the parts of plants a certain odour arising from resinous or camphorous substances, as in the *Laurineæ*, *Labiatæ*, *Umbelliferæ*, and *Hesperideæ*; on the contrary, the odours of flowers are the effects of a particular function, by which a simple evaporation of the secreted substances is produced. [This, as well as most of the other statements, which are disproved by already existing observations, have been proved incorrect by the reporter M. Morren.] In general, the principal residence of the smell is in the upper surface of the corolla; if there is only a simple perigonium, the smell comes from its inner surface. The filaments have a smell similar to that of the corolla; the anthers, on the contrary, have a spermatic odour; the female organs are rarely odorous, as in saffron. The organs which evolve the odorous substances are, according to the author, always glands, which are said to have often escaped the observation of physiologists; however, M. Morren states that the author has applied the name of glands to some formations which certainly cannot be so called, *e. g.* he has held the resinous globules for glands, which I first discovered in the petals of *Magnolia grandiflora*; indeed M. Trinchinetti considers the papillæ on the petals to be organs in which these odoriferous matters are secreted. In relation to the chemical theory of the formation of odours, the author has only given that of Fourcroy and Couerbe; and he explains the exhalation of the odoriferous substances by a simple evaporation through organic and inorganic (?) pores, which takes place on the epidermis of the inner or upper surface of the flowering organs. If this upper surface be covered with wax, the result is said to become weaker; if the under surface be covered it remains the same, and turgescence increases the exhalation.

The question, "For what purpose do flowers smell?" is answered by M. Trinchinetti as follows:—It may be that the smells of plants were destined as a source of pleasure for mankind, and by these they exhibit their medicinal properties. However, nature strives doubtlessly to effect more than one object by these odours,—they are evidently intended to assist the sexual functions of the flowers; for M. Trinchinetti believes that the sexual organs are nourished by a sap which is prepared in the petals. The odorous exhalations of flowers exert a physical influence on the sexual organs, inasmuch as they diminish the tension of the steam which is so very injurious to the pollen which is burst by it, and thus fertilization cannot take place. He states that the flowers are surrounded by an odoriferous atmosphere which defends the sexual organs from the injurious influence of the aqueous vapours;

hence it comes, that flowers in which the sexual organs are much closed do not smell; on the contrary, other flowers smell strongest exactly in the dampest hours of the day and night.

In the second part of the treatise M. Trinchinetti considers the odours in detail; he says, that flowers which become odorous towards the end of their existence, as for instance *Asperula odorata*, produce this smell by the commencement of decomposition, and that it is not a product of vitality; that there are flowers which, when pressed, evolve a different smell to what they do in their natural state, e. g. *Allium moschatum*, *Sambucus ebulus*, &c. Flowers which only smell in the morning, evening, and night, lose their smell during the day by the action of the light and heat, which dissipate the odorous principle; but to this M. Morren answers, that these plants do not even smell by day when inclosed in a damp, dark place. Finally, the author attempts to answer the question as to the cause of intermitting odours: flowers which exhibit this phænomenon either open and shut at fixed periods, or they remain always open, and only the smell is intermittent: thus the inquiry is divided into two parts; in the first the phænomenon is brought in connexion with the cause of the opening and shutting of the flower, and in the second a peculiar physiological cause as producing it is assumed. In the first case flowers are either shut by day and open and odorous by night, or *vice versâ*. In the second part those plants are mentioned which are always open, but possess an intermittent smell; here are also two divisions, the flowers smell either by day or by night. In *Cestrum diurnum* the smell is much weaker by night. *Coronilla glauca* smells only by day, and *Cacalia septentrionalis* is said to lose its smell when protected from the rays of the sun. *Pelargonium triste* begins to smell about five in the afternoon; in the night the smell becomes stronger till about five in the morning, whereupon it diminishes, and disappears entirely at seven. The surfaces of these odorous petals are said to exhibit in the evening shining corpuscles (cells filled with sap) which are not seen in the day. If the plants were kept the whole day in the dusk, the smell made its appearance later than usual and was also much weaker. Moist air produced no smell in the plants during the day; on the contrary, *Cestrum nocturnum*, kept in the dark and in a moist atmosphere, exhibited a slight smell.

On the Formation of Colours in Plants.

M. Elsner has drawn attention to the fact, that in the year 1832, in a treatise in Schweigger-Seidel's Annual of Chemistry

hence it comes, that flowers in which the sexual organs are much closed do not smell; on the contrary, other flowers smell strongest exactly in the dampest hours of the day and night.

In the second part of the treatise M. Trinchinetti considers the odours in detail; he says, that flowers which become odorous towards the end of their existence, as for instance *Asperula odorata*, produce this smell by the commencement of decomposition, and that it is not a product of vitality; that there are flowers which, when pressed, evolve a different smell to what they do in their natural state, e. g. *Allium moschatum*, *Sambucus ebulus*, &c. Flowers which only smell in the morning, evening, and night, lose their smell during the day by the action of the light and heat, which dissipate the odorous principle; but to this M. Morren answers, that these plants do not even smell by day when inclosed in a damp, dark place. Finally, the author attempts to answer the question as to the cause of intermitting odours: flowers which exhibit this phænomenon either open and shut at fixed periods, or they remain always open, and only the smell is intermittent: thus the inquiry is divided into two parts; in the first the phænomenon is brought in connexion with the cause of the opening and shutting of the flower, and in the second a peculiar physiological cause as producing it is assumed. In the first case flowers are either shut by day and open and odorous by night, or *vice versâ*. In the second part those plants are mentioned which are always open, but possess an intermittent smell; here are also two divisions, the flowers smell either by day or by night. In *Cestrum diurnum* the smell is much weaker by night. *Coronilla glauca* smells only by day, and *Cacalia septentrionalis* is said to lose its smell when protected from the rays of the sun. *Pelargonium triste* begins to smell about five in the afternoon; in the night the smell becomes stronger till about five in the morning, whereupon it diminishes, and disappears entirely at seven. The surfaces of these odorous petals are said to exhibit in the evening shining corpuscles (cells filled with sap) which are not seen in the day. If the plants were kept the whole day in the dusk, the smell made its appearance later than usual and was also much weaker. Moist air produced no smell in the plants during the day; on the contrary, *Cestrum nocturnum*, kept in the dark and in a moist atmosphere, exhibited a slight smell.

On the Formation of Colours in Plants.

M. Elsner has drawn attention to the fact, that in the year 1832, in a treatise in Schweigger-Seidel's Annual of Chemistry

hence it comes, that flowers in which the sexual organs are much closed do not smell; on the contrary, other flowers smell strongest exactly in the dampest hours of the day and night.

In the second part of the treatise M. Trinchinetti considers the odours in detail; he says, that flowers which become odorous towards the end of their existence, as for instance *Asperula odorata*, produce this smell by the commencement of decomposition, and that it is not a product of vitality; that there are flowers which, when pressed, evolve a different smell to what they do in their natural state, e. g. *Allium moschatum*, *Sambucus ebulus*, &c. Flowers which only smell in the morning, evening, and night, lose their smell during the day by the action of the light and heat, which dissipate the odorous principle; but to this M. Morren answers, that these plants do not even smell by day when inclosed in a damp, dark place. Finally, the author attempts to answer the question as to the cause of intermitting odours: flowers which exhibit this phænomenon either open and shut at fixed periods, or they remain always open, and only the smell is intermittent: thus the inquiry is divided into two parts; in the first the phænomenon is brought in connexion with the cause of the opening and shutting of the flower, and in the second a peculiar physiological cause as producing it is assumed. In the first case flowers are either shut by day and open and odorous by night, or *vice versâ*. In the second part those plants are mentioned which are always open, but possess an intermittent smell; here are also two divisions, the flowers smell either by day or by night. In *Cestrum diurnum* the smell is much weaker by night. *Coronilla glauca* smells only by day, and *Cacalia septentrionalis* is said to lose its smell when protected from the rays of the sun. *Pelargonium triste* begins to smell about five in the afternoon; in the night the smell becomes stronger till about five in the morning, whereupon it diminishes, and disappears entirely at seven. The surfaces of these odorous petals are said to exhibit in the evening shining corpuscles (cells filled with sap) which are not seen in the day. If the plants were kept the whole day in the dusk, the smell made its appearance later than usual and was also much weaker. Moist air produced no smell in the plants during the day; on the contrary, *Cestrum nocturnum*, kept in the dark and in a moist atmosphere, exhibited a slight smell.

On the Formation of Colours in Plants.

M. Elsner has drawn attention to the fact, that in the year 1832, in a treatise in Schweigger-Seidel's Annual of Chemistry

(lxv. p. 165—175), he had already proved the identity of the red colouring matter in the flowers of the *Irideæ, Labiatæ, Rosaceæ, Ranunculaceæ, Geraniaceæ, Cannaceæ, Malvaceæ, Leguminosæ, Papaveraceæ, Myrtaceæ,* &c.; and that the red colour in the bracts of *Melampyrum arvense,* in the leaves of *Caladium bicolor,* in the fruit of *Prunus cerasus, Ribes rubrum, Sorbus ancuparia,* is similar, and that the identity extends to the red matter which colours the leaves in autumn.

From M. Morren* we have received anatomico-physiological researches on the appearance of indigo in *Polygonum tinctorium*; the work had been read to the Brussels Academy before the appearance of a similar one by M. Turpin, which was mentioned in the former Report, and is therefore to be considered as cotemporary with it. The views of MM. Turpin and Morren on the production of the indigo differ from each other. The former found this substance in the sap-globules of the cells which were coloured green by chlorophyll, but M. Morren believes that the indigo is produced in the intercellular sap (by which is meant the ordinary cell-sap). I may here state with certainty, from my own observations, that the blue colouring matter in *Polygonum tinctorium* is formed out of the previously green-coloured cell-sap globules. Whether however, in the colourless cell-sap of that plant, a substance is contained in solution which changes into indigo (as appears from M. Morren's statements) I cannot say, having made no decisive observations, and this is not at present the time for it. The expressed sap of the leaves ought to be perfectly filtered and then treated for the formation of indigo, by which the question would be settled. Indigo is formed in all parts of *Polygonum,* but principally in the leaves; here it is found in the parenchym and also in the nerves, and only the "tissu fibro-vasculaire" does not contain a trace.

M. Morren directs attention to the regular position of the adventitious roots in this plant, which, as is so often the case with the genus *Polygonum,* grow out of the nodes.

M. Hünefeld† has communicated some more of his continued researches on vegetable colours; he has also found that there is not the same similarity between the colours of the different parts of plants, as for instance, the roots, leaves, flowers, and fruits, as would seem from outward appearances, and as some botanists have asserted. Very few changes of colour in plants are produced by the action of acid or basic substances. Moreover M. Hünefeld has published a long series of experiments

---

* Mém. de l'Acad. Royale des Sc., &c., de Bruxelles, tome xii.

† Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 65—80.

(lxv. p. 165—175), he had already proved the identity of the red colouring matter in the flowers of the *Irideæ, Labiatæ, Rosaceæ, Ranunculaceæ, Geraniaceæ, Cannaceæ, Malvaceæ, Leguminosæ, Papaveraceæ, Myrtaceæ,* &c.; and that the red colour in the bracts of *Melampyrum arvense,* in the leaves of *Caladium bicolor,* in the fruit of *Prunus cerasus, Ribes rubrum, Sorbus ancuparia,* is similar, and that the identity extends to the red matter which colours the leaves in autumn.

From M. Morren* we have received anatomico-physiological researches on the appearance of indigo in *Polygonum tinctorium*; the work had been read to the Brussels Academy before the appearance of a similar one by M. Turpin, which was mentioned in the former Report, and is therefore to be considered as cotemporary with it. The views of MM. Turpin and Morren on the production of the indigo differ from each other. The former found this substance in the sap-globules of the cells which were coloured green by chlorophyll, but M. Morren believes that the indigo is produced in the intercellular sap (by which is meant the ordinary cell-sap). I may here state with certainty, from my own observations, that the blue colouring matter in *Polygonum tinctorium* is formed out of the previously green-coloured cell-sap globules. Whether however, in the colourless cell-sap of that plant, a substance is contained in solution which changes into indigo (as appears from M. Morren's statements) I cannot say, having made no decisive observations, and this is not at present the time for it. The expressed sap of the leaves ought to be perfectly filtered and then treated for the formation of indigo, by which the question would be settled. Indigo is formed in all parts of *Polygonum,* but principally in the leaves; here it is found in the parenchym and also in the nerves, and only the "tissu fibro-vasculaire" does not contain a trace.

M. Morren directs attention to the regular position of the adventitious roots in this plant, which, as is so often the case with the genus *Polygonum,* grow out of the nodes.

M. Hünefeld† has communicated some more of his continued researches on vegetable colours; he has also found that there is not the same similarity between the colours of the different parts of plants, as for instance, the roots, leaves, flowers, and fruits, as would seem from outward appearances, and as some botanists have asserted. Very few changes of colour in plants are produced by the action of acid or basic substances. Moreover M. Hünefeld has published a long series of experiments

---

* Mém. de l'Acad. Royale des Sc., &c., de Bruxelles, tome xii.

† Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 65—80.

(lxv. p. 165—175), he had already proved the identity of the red colouring matter in the flowers of the *Irideæ, Labiatæ, Rosaceæ, Ranunculaceæ, Geraniaceæ, Cannaceæ, Malvaceæ, Leguminosæ, Papaveraceæ, Myrtaceæ,* &c.; and that the red colour in the bracts of *Melampyrum arvense,* in the leaves of *Caladium bicolor,* in the fruit of *Prunus cerasus, Ribes rubrum, Sorbus ancuparia,* is similar, and that the identity extends to the red matter which colours the leaves in autumn.

From M. Morren* we have received anatomico-physiological researches on the appearance of indigo in *Polygonum tinctorium*; the work had been read to the Brussels Academy before the appearance of a similar one by M. Turpin, which was mentioned in the former Report, and is therefore to be considered as cotemporary with it. The views of MM. Turpin and Morren on the production of the indigo differ from each other. The former found this substance in the sap-globules of the cells which were coloured green by chlorophyll, but M. Morren believes that the indigo is produced in the intercellular sap (by which is meant the ordinary cell-sap). I may here state with certainty, from my own observations, that the blue colouring matter in *Polygonum tinctorium* is formed out of the previously green-coloured cell-sap globules. Whether however, in the colourless cell-sap of that plant, a substance is contained in solution which changes into indigo (as appears from M. Morren's statements) I cannot say, having made no decisive observations, and this is not at present the time for it. The expressed sap of the leaves ought to be perfectly filtered and then treated for the formation of indigo, by which the question would be settled. Indigo is formed in all parts of *Polygonum,* but principally in the leaves; here it is found in the parenchym and also in the nerves, and only the "tissu fibro-vasculaire" does not contain a trace.

M. Morren directs attention to the regular position of the adventitious roots in this plant, which, as is so often the case with the genus *Polygonum,* grow out of the nodes.

M. Hünefeld† has communicated some more of his continued researches on vegetable colours; he has also found that there is not the same similarity between the colours of the different parts of plants, as for instance, the roots, leaves, flowers, and fruits, as would seem from outward appearances, and as some botanists have asserted. Very few changes of colour in plants are produced by the action of acid or basic substances. Moreover M. Hünefeld has published a long series of experiments

which he made on the behaviour of vegetable colours to several liquids, more especially æther, oil of turpentine, and some others, in the course of which several curious facts have been brought to light; the conclusions which M. Hünefeld has drawn, and which may interest us, are—the pigments of reddish yellow, or of *not*-yellow flowers, are probably all of an extractive nature.

---

* Mém. de l'Acad. Royale des Sc., &c., de Bruxelles, tome xii.

† Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 65—80.

For the examination of these colouring matters æther is a very useful solvent. The variety of colouring of a flower or leaf frequently arises from the deposition of one pigment over the other, or from their mixture. [On this subject better information is to be had from the newer phytotomic works.—*Mey.*] The principal change which the colours suffer in withering, etc. appears to be, that the assimilation of carbon only ceases by suppressed vegetation, while the absorption of atmospheric oxygen becomes excessive; for the easily oxidizable extractive matters, and tannin in oxidized extractive matter, become metamorphosed into gallic acid and into substances approaching more and more to humic acid, which then destroy the pigments.

M. Hünefeld* has also made a series of experiments to learn whether the formation of certain colours depends on iron contained in the plant. Quantities (one or two ounces) of the most different-coloured flowers were reduced to ashes. Some of these flowers contained evidently iron and manganese, others only iron, and traces of copper were found in the flowers of *Sambucus nigra*, which had already been noticed. The twigs and leaves of *Sambucus nigra* are said to contain no copper, but a considerable quantity of iron. Traces of manganese were found everywhere when sufficient quantities were burnt. As these metals, says M. Hünefeld, are found also in white flowers, and their quantities stand in no relation to the colours of the flowers, it seems that Meissner's theory is not correct. There is probably no vegetable which does not contain iron, and perhaps all the iron found in the human body is derived from this source.

[To be continued.]

VII.—*Indian* Cyprinidæ. By John M'Clelland, Assistant Surgeon Bengal Medical Service †.

Dr. Patrick Russell published in 1803 an account of 200 species of fishes found chiefly on the coast of Coromandel;

---

* Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 84—87.

† From the 'Asiatic Researches,' vol. xix. part ii. p. 217; having been presented to the Asiatic Society of Bengal on the 5th of September 1838.

which he made on the behaviour of vegetable colours to several liquids, more especially æther, oil of turpentine, and some others, in the course of which several curious facts have been brought to light; the conclusions which M. Hünefeld has drawn, and which may interest us, are—the pigments of reddish yellow, or of *not*-yellow flowers, are probably all of an extractive nature.

For the examination of these colouring matters æther is a very useful solvent. The variety of colouring of a flower or leaf frequently arises from the deposition of one pigment over the other, or from their mixture. [On this subject better information is to be had from the newer phytotomic works.—*Mey.*] The principal change which the colours suffer in withering, etc. appears to be, that the assimilation of carbon only ceases by suppressed vegetation, while the absorption of atmospheric oxygen becomes excessive; for the easily oxidizable extractive matters, and tannin in oxidized extractive matter, become metamorphosed into gallic acid and into substances approaching more and more to humic acid, which then destroy the pigments.

M. Hünefeld* has also made a series of experiments to learn whether the formation of certain colours depends on iron contained in the plant. Quantities (one or two ounces) of the most different-coloured flowers were reduced to ashes. Some of these flowers contained evidently iron and manganese, others only iron, and traces of copper were found in the flowers of *Sambucus nigra*, which had already been noticed. The twigs and leaves of *Sambucus nigra* are said to contain no copper, but a considerable quantity of iron. Traces of manganese were found everywhere when sufficient quantities were burnt. As these metals, says M. Hünefeld, are found also in white flowers, and their quantities stand in no relation to the colours of the flowers, it seems that Meissner's theory is not correct. There is probably no vegetable which does not contain iron, and perhaps all the iron found in the human body is derived from this source.

[To be continued.]

VII.—*Indian* Cyprinidæ. By John M'Clelland, Assistant Surgeon Bengal Medical Service†.

Dr. Patrick Russell published in 1803 an account of 200 species of fishes found chiefly on the coast of Coromandel;

---

* Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 84—87.

† From the 'Asiatic Researches,' vol. xix. part ii. p. 217; having been presented to the Asiatic Society of Bengal on the 5th of September 1838.

which he made on the behaviour of vegetable colours to several liquids, more especially æther, oil of turpentine, and some others, in the course of which several curious facts have been brought to light; the conclusions which M. Hünefeld has drawn, and which may interest us, are—the pigments of reddish yellow, or of *not*-yellow flowers, are probably all of an extractive nature.

For the examination of these colouring matters æther is a very useful solvent. The variety of colouring of a flower or leaf frequently arises from the deposition of one pigment over the other, or from their mixture. [On this subject better information is to be had from the newer phytotomic works.—*Mey.*] The principal change which the colours suffer in withering, etc. appears to be, that the assimilation of carbon only ceases by suppressed vegetation, while the absorption of atmospheric oxygen becomes excessive; for the easily oxidizable extractive matters, and tannin in oxidized extractive matter, become metamorphosed into gallic acid and into substances approaching more and more to humic acid, which then destroy the pigments.

M. Hünefeld* has also made a series of experiments to learn whether the formation of certain colours depends on iron contained in the plant. Quantities (one or two ounces) of the most different-coloured flowers were reduced to ashes. Some of these flowers contained evidently iron and manganese, others only iron, and traces of copper were found in the flowers of *Sambucus nigra*, which had already been noticed. The twigs and leaves of *Sambucus nigra* are said to contain no copper, but a considerable quantity of iron. Traces of manganese were found everywhere when sufficient quantities were burnt. As these metals, says M. Hünefeld, are found also in white flowers, and their quantities stand in no relation to the colours of the flowers, it seems that Meissner's theory is not correct. There is probably no vegetable which does not contain iron, and perhaps all the iron found in the human body is derived from this source.

[To be continued.]

VII.—*Indian* Cyprinidæ. By John M'Clelland, Assistant Surgeon Bengal Medical Service†.

Dr. Patrick Russell published in 1803 an account of 200 species of fishes found chiefly on the coast of Coromandel;

---

* Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 84—87.

† From the 'Asiatic Researches,' vol. xix. part ii. p. 217; having been presented to the Asiatic Society of Bengal on the 5th of September 1838.